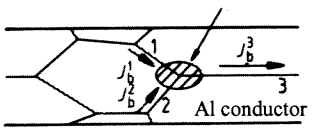
ELEC-E8712 Design for Reliability (5 cr)

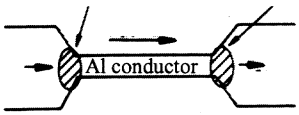
3rd midterm exam 14.12.2017

1. **a)** What kind of corrosion mechanisms are observed in IC (Integrated circuit) level Aluminium metallizations/conductors? (1p)
   b) Explain shortly, what is electromigration? With the help of the figures below, **explain** the critical locations for electromigration failures. (3p)

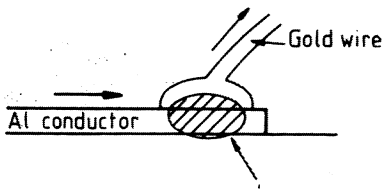
(a)



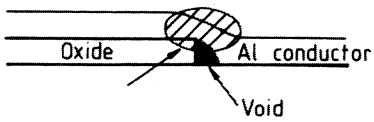
(b)



(c)



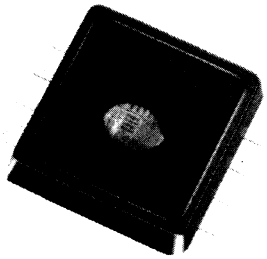
(d)

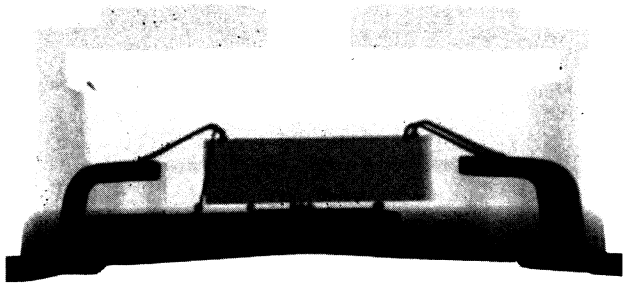


   c) What are the most commonly used methods (/materials) used in die attach? (2p)
   d) Explain shortly the most commonly used DCA [Direct Chip Attachment (i.e. package level interconnection)] methods (processes and materials). In addition, compare the main advantages and disadvantages of these technologies. (4p)

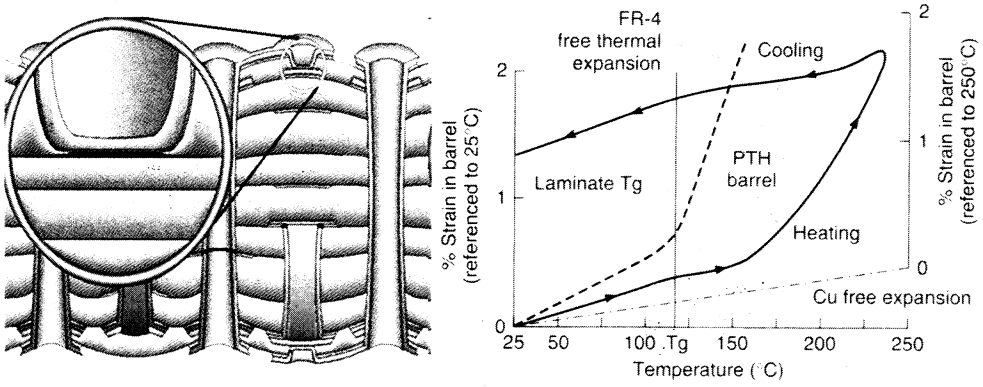
Answer only two out of three following questions (i.e. Questions2-4)

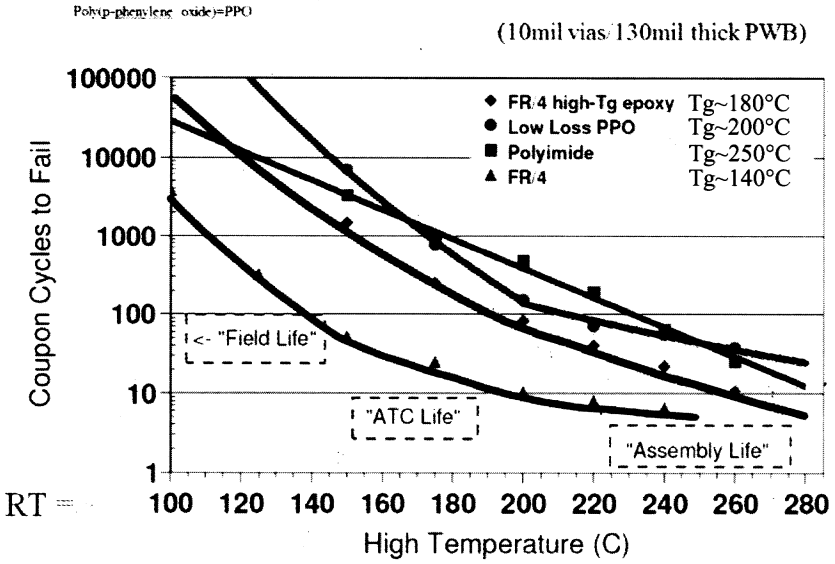
2. **a)** What are the basic reasons and requirements for semiconductor packaging i.e Why components need to be packaged? (2p)
   b) Discuss on the specific requirements and challenges related to the packaging of MEMS sensor components (Pressure sensor from Infineon presented below as an example). (3p)



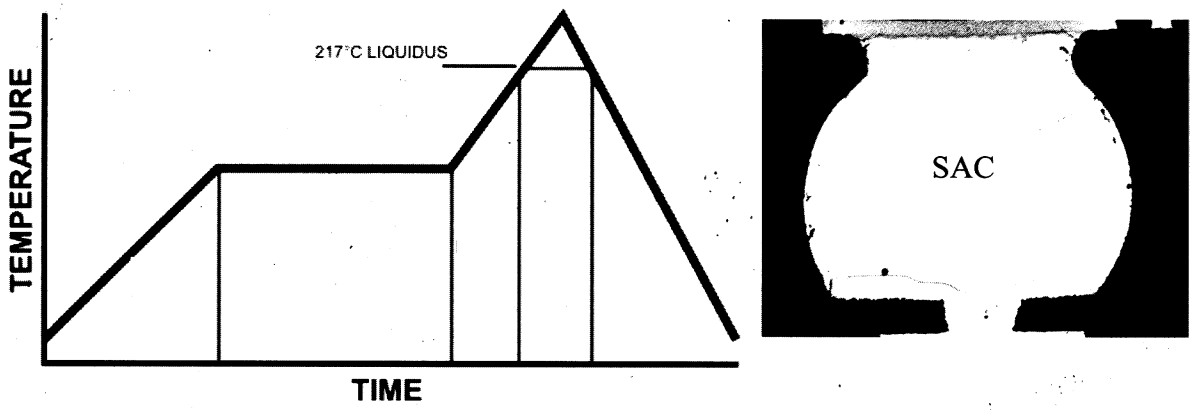


3. With the help of Figures below, please explain how (and why) the changes in temperature effect on the reliability of the PTH (Plated through holes) and microvias of PCBs (Printed Circuit Boards). (5p)





4. Explain the basic stages in s.c "reflow profile" and define shortly their effects on solder joint (SnAgCu=SAC solder, T_{mp}=217°C) quality and reliability. (5p)



NB. You can give your answers either on English of Finnish.

Essay type answers are NOT required!